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ABSTRACT

This state-of-the-art survey of non-bibliographic databases and their use within the fields of economics and business studies recommends that schools of librarianship and information science incorporate online teaching packages encompassing such databases in their programs. The review, conducted through on-site visits and a questionnaire, focuses on the activities of three major suppliers and identifies the environment in which their databases are used and the information needs of end users. It also discusses user interaction with the systems, training programs for system operators and users, online costs and economics, and the impact of online services. The rapidly expanding use of non-bibliographic databases, and the fact that information accessed from these databases in many cases is not available in print, underline the importance of including these sources in information studies curriculums. (RAA)

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NON-BIBLIOGRAPHIC DATA-BASES: AN INVESTIGATION INTO THEIR USES WITHIN THE FIELDS OF ECONOMICS AND BUSINESS STUDIES.

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Keywords: *Information Retrieval, On-Line Systems, Non-Bibliographic Data-Bases, Numeric Data-Bases, Hard Data-Bases, Data-Banks.*
Abstract: The remarkable growth of on-line bibliographic data-base services over the past five years is currently being challenged by a similar growth in the field of non-bibliographic on-line data-bases, variously referred to as data-banks, or hard or numeric data-bases. There are at present more than 150 of these data-bases publicly available on-line and many other in-house generated services covering the areas of science and technology, business and economics and also the social sciences.

In view of the potential of access to non-bibliographic on-line data-bases it is surprising that little is known of their mode of use in the United Kingdom or abroad.

The authors, with funding from the British Library, undertook a state-of-the-art survey to clear the ground for the development of teaching packages to introduce potential users to non-bibliographic on-line data-bases. We believe that it is in the interest of the library and information professions to be both aware of and prepared for this rapidly expanding phenomenon for the retrieval of information.

1 INTRODUCTION

The Department of Library and Information Studies (D.O.L.I.S.) at Liverpool Polytechnic has been using on-line access to bibliographic data-bases since 1976 and a POLYLINE service was established in 1977 to run literature searches for members of the academic staff and postgraduate students within the Polytechnic. The Department was the first institution on Merseyside to use on-line bibliographic data-bases and in the last eighteen months a number of organizations in the area have turned to D.O.L.I.S. for information on on-line interaction. However, a number of colleagues, while finding on-line access to bibliographic data-bases very interesting, have indicated to us that their real needs are for hard, factual data. These views were echoed at some meetings of the Merseyside On-Line Users Group.

A proposal to develop a teaching methodology for the use of non-bibliographic data-bases was put to the British Library and after consultation it was mutually agreed that an initial state-of-the-art investigation into the environment in which current use is being made of these bases would be undertaken with funding from the British Library Research and Development Department.

Our investigation proposed to identify both the environment in which non-bibliographic data-bases are being used and the information needs of end-users of these bases. It also attempted to identify the way in which users interact with systems and what training programmes, if any, have been developed for system operators and end-users. We further aimed to investigate how access to the data-bases has influenced the operational efficiency of the organisation concerned and an attempt was made to obtain feed-back from end-users as to the usefullness of the information they obtained from the data-bases.

2 METHODOLOGY

With the co-operation of selected service suppliers lists of users were identified from a variety of academic, industrial, business and financial sectors in the United Kingdom, Europe and United States. A questionnaire, covering the areas proposed in the introduction, was designed and circulated to the sample of the data-base users.

Visits were made to interview a representative sample of users in their offices in the United Kingdom, Europe and U.S.A. to discuss the questionnaire and obtain feed-back. Users in locations throughout the U.K. were either interviewed personally or by telephone. In the U.S.A. users were interviewed in the Washington, New York, New England areas, also Chicago and California. In Europe the main areas of concentration were Amsterdam, Brussels, Milan, Paris, Rome and Zurich.

3 THE SYSTEM SUPPLIERS

Three major suppliers of on-line economic and financial data were asked for their co-operation. There are many commercial suppliers of this type of information and we selected three of the largest operators who were able to give us a large enough sample of clients to investigate. The three suppliers who offered their assistance are the Business International Corporation of New York, Data Resources Incorporated of Lexington, Massachussetts, and the ADP Network Services, Incorporated, of Ann Arbor, Michigan. Some U.K. users of the Predicasts service were also polled as this is probably the most well known supplier of business information in U.K. libraries although a significant proportion of the information they offer is in bibliographic form.

Besides our own investigation, the liaison with the suppliers was seen to have a three fold purpose. (1) We hoped to offer the supplier information which would be useful to their own market research and customer support departments; (2) We aimed to help the clients by making their supplier more aware of their individual needs, (3) We sought to introduce both suppliers and users to the concept of librarians and information officers trained in the use of non-bibliographic data-bases.

Data Resources Inc.

Data Resources Inc. (DRI) founded in 1968, is an economic information service company providing economic data and forecasts to over 600 clients for use in analysing present and future levels of different economic indicators. DRI offers four major services: computer accessible economic data-banks, econometric models and forecasting; associated data processing services, and consulting. These services are made available through direct access to DRI's computers via its own communications network.

DRI's economic data-bases include the U.S. Central Data-Base, California Data-Bank and U.S. Regional Data-Bank offering U.S. macroeconomic and micro-economic times series. The financial data-bases include the Compustat Data-Bank and Value Line Data Pool. The international data-bases cover the EEC, Japan and Canada and include the European National Source Data-Bank and OECD Main Economic Indicators. DRI also offers energy and weather data-bases including the OECD Energy Data-Bank and the U.S. Agricultural Weather Data-Bank.

DRI's econometric models offer forecasts of US economic and industrial activity, and separate European, Canadian and Japanese services.

DRI also offers a wide variety of software programs including their own developed Econometric Programming System (EPS).

Business International, Inc.

Business International is an independant publishing and advisory organization serving over 700 corporations and governments doing business throughout the world. Established in 1954 its facilties span 75 countries.

BI/DATA is Business International's data-base on national accounts and marketing statistics. It consists of approximately 10,500 time series covering 150 measures of economic and marketing activity for 70 countries. These include demographic data, gross domestic product, personal consumption, industrial production, labour costs and conditions, exports and imports, exchange and interest rates etc. BI/DATA's time span is from 1960 to the last year for historic data, and next year in forecasts. Access to the data-base is made available by arrangement with the General Electric Information Services Company (GEISCO) and using G.E.'s international time-sharing network.

Automatic Data Processing, Inc. (ADP)

ADP formed in 1949, is a large, independent computing services company with more than 60,000 clients worldwide. ADP provides a wide range of computer services from payroll and accounting functions to econometric modelling via its international teleprocessing network.

The ADP Network Services division offers data-bases in finance, securities, analysis, economics, foreign exchange rates, demographics and chemistry. Its facilities include the financial and banking service FINALYST for analysing and reporting on financial data for European and United States companies. The FINALYST data-bases include EXSTAT, COMPUSTAT, and VALUE LINE. The statistics/data analysis service TSAM is an integrated system for analysing historical and forecast time series for regional, national and international variables, and modelling of financial and econometric situations. The Foreign Exchange Rate Service, FX, provides daily updatings of the rates of 33 currencies and the Business Analysis Service offers reports and forecasts on market shares and product performance.

4 ANALYSIS OF THE QUESTIONNAIRE

This paper was submitted with four months of the project time still to run. The results recorded below are almost exclusively responses from U.K. and U.S.A. users (approximately 50% from each) and represent about 40% of the total expected sample. The results are given in percentages to avoid misinterpretations which might occur from reporting absolute numbers with disparate subsample sizes.

Background Information

Clients were given a choice of seven categories (see Appendix 1 for a complete list of questions) to describe their organization. 84% worked in business or industrial companies, 13% were from government agencies and 3% from research organizations. The actual departments in which they worked included 43% from the planning department, 26% from library and information services sections, 13% from research and R and D units, 7% from marketing and 3% from technical departments.

The number of employees in the average respondents organization is 24,000 with one response of more than 100,000 and two with less than 1000 employees. The majority of repondents work in departments with between 1 and 25 persons with an average of 31.

These data show that the major influence in the response comes from organizations in the commercial sector and more individually from the planning department or the library or information services sections. The size of the majority of organizations reflects the national and international status of many of the companies involved. The size of the average planning department was larger, with 37 employees, than the average information section with 17 employees.

The position of the respondents concerning searching and search supervising was 29% searchers, 10% were search supervisors and 6% did both. (Throughout this paper a 'searcher' is taken to mean one who may both retrieve and analyse data on-line).

The occupations of the respondents fell into the six categories shown below.

Occupation	% of respondents
Administrator or Manager	19
Financial Analyst	10
Librarian/Information Specialist	29
Research Assistant /Analyst	9
Economists/Econometricians (Social Scientists)	30
Scientist	3

This data implies that there is as much work being handled with non-bibliographic data-bases by librarians and information officers as by economists. However, these figures are probably inflated by inclusion of the Predicasts only users responses and a more likely distribution is seen when the Predicasts only respondents are excluded and the librarian/information specialist category drops dramatically to only 13%.

54% of the searchers had little or no previous experience of on-line services, 26% had some experience and 24% considerable experience. (Throughout this paper 'on-line services' refer to non-bibliographic on-line services unless otherwise stated). This is consistent with some views expressed at the interviews by economists and analysts who said little or no mention had been made of on-line business information systems on their undergraduate degree courses.

On-Line Costs and Economics

The users were asked to give the annual cost of the on-line service, including telecommunications costs, (but excluding staff, paper and terminals).

Annual Expenditure	% of respondents
Less than £500/$1000	3
£500-1000/$1000-2000	3
£1000-5000/$2000-10000	26
£5000-10000/$10000-20000	10
More than £100000/$20000	52
No response	6

More than half the organizations are spending above £10000/$20000 p.a. Unfortunately we are unable to tell how much more than this they spend.

32% reported this expenditure to include paying a 'joining-up' or registration fee to the service supplier. These fees were for an average of 3 data-bases per organisation. The actual cost of registration varied enormously from £10/$20 to £10000/$20000 and reflects the vast difference in the contents of each service. A lot of clients do not purchase the use of individual data-bases but rather a whole service which may include a number of data-bases, a software package for specialised manipulation of the data, and a consulting service.

48% of the users reported paying regular access fees for an average of three data-bases costing £5000/$10000 p.a.

In view of the amount of money spent, clients were asked if their organization had to reduce other expenditure to accommodate the on-line service.

77% reported no and 13% yes. (10% did not respond).

Other services which had been cut back included the preparation of in-house data-bases with contents similar to those offered by the commercial suppliers; the purchase of hard copy material; and general pruning of the computing budget.

Respondents were asked how they justified the continued cost of the on-line service to management. A sample of the most common reasons are listed:

- Saving in staff time means a faster service
- Wider range of information available on-line than in printed sources
- Necessity for accurate up to date data for economic forecasting
- Analysis of data leads to a more effective management of the banks assets and liabilities
- Econometric models based on this data are used to meet regulatory requirements
- It increases availability and timeliness of economic time series as well as providing sophisticated software
- On-line services offer quick start-ups for new analysis, e.g. company expenditure/profit and the consolidations of these into groups
- Due to staff outback we had to go on-line to maintain the service
- Most cost effective way to get information required by management

Two respondents reported never having to justify the cost. These were both from government agencies!

Systems and Data-Bases Used

Respondents were asked how long their departments had been using non-bibliographic on-line systems.

Length of time	% of respondents
Less than 1 year	13
1 - 2 years	10
2 - 3 years	32
3 - 4 years	16
5 or more	29

These figures show that non-bibliographic data on-line is not a new phenonemon but well established in most of the responding organisations.

Percentage of respondents using each on-line service:

Service Supplier	% of respondents to each supplier
Automatic Data Processing Inc (ADP)	48
BLAISE (British Library)	26
Data Resources Inc. (DRI)	52
General Electric (includes BI/DATA)	16
Lockheed Information Systems (DIALOG)	39
SDC Search Service (ORBIT)	29
Space Documentation Service (ESA)	19
Other	35

23% of respondents were using bibliographic systems as well as the numeric systems with Lockheed being cited most. 35% were using more than one numeric system. 15 other non-bibliographic systems were mentioned, each by less than five respondents. It should be remembered that some users of multiple systems spend more time on one particular base and that neither their preferences, nor any degree of overlap is represented in the data.

45% of respondents thought that their departments had used bibliographic data-bases at one time even though they were not using them now. It could be that experience of bibliographic data-bases has led on to the use of non-bibliographic data-bases but it is also possible that some numeric systems now available were previously available in a less sophisticated, bibliographic form.

The top-ranked data-bases used by each respondent is shown below:

Most frequently used data-bases	% of respondents
DRI (all bases)	17
DRI US Central data-bank	17

BI/DATA data-bank	13
CSO data-base	13
ADP (all bases)	8
CHASE US economic data-bank	8
ADP FX data-bank	4
DRI EECEUROPE	4
RAPIDATA (all bases)	4

20 other non-bibliographic data-bases were listed including a number of in-house services. Analysis of this kind of question is made difficult by some users not distinguishing between systems and data-bases.

We also asked how many people were known by the respondent to use the on-line service at least once a month. The average number was eight but ranged from one to 'hundreds' although the latter included the use of in-house computer systems.

Users and uses of on-line data-bases

To get some idea of the nature of the users of non-bibliographic data-bases on-line we asked how many hours were spent on-line by the average searcher/analyst in a typical workday and over the period of a month. The average number of hours spent on-line by an individual was 19 ranging from less than 5 to over 40. Each department as a whole spent an average of 58 hours on-line. This does not tell us how many 'information problems' are being dealt with in this time but the length of the average on-line search, including analysis and manipulation of data was 23 minutes.

Actual location of relevant data usually takes less than 14 minutes. Unlike the bibliographic file searcher who looks to see if a particular piece of information is available, the non-bibliographic file searcher generally knows what is available in each base and searches to locate exact data. It is the analysis of this data on-line which accounts for most of the time spent on-line.

22% specified about 40 minutes to be the maximum acceptable time for an on-line search while over 70% said there was no limit as long as they got all the information necessary.

To obtain data on the end-users we asked if the individuals who planned to use the information did their own searching and analysis or used an intermediary.

Searchers/Analysts	% of respondents
All searches done by intermediary	52
25% by end-user and 75% by intermediary	6
50% by end-user and 50% by intermediary	6
75% by end-user and 25% by intermediary	13
All searches done by end-user	23

It should be stressed here that the intermediary is not necessarily employed solely to conduct on-line operations but is more likely an economist, analyst or planner etc. producing a report for management.

In trying to identify end-users we asked which departments they came from and whether or not they were outside clients.

Department	% of respondents to each group
Accounts	19
Analysts/Economists/Planners	80
Marketing	52
Personnel	26
Production	19
Purchasing	13
Research and Development	35
Information Officers/Librarians	19
Other	13

15% of the end-users were outside clients mostly in the analysts/economists/planners category.

Information Needs

Respondents were asked to select from a number of possibilities all of the end-purposes for which on-line systems were regularly used.

Purpose	% of respondents to each group
To help an individual give a paper or write a speech	23
To help in decision making, e.g. to solve an immediate problem	74
To provide general support to planning and evaluation	74
To provide general support to research and development	32
To provide general support to marketing	39
To provide general support to operational activities	35
To help one or more individual stay abreast of development in a particular area	52

With reference to particular information needs we asked respondents what the relative balance of their information needs was in terms of historical, current, or forecast information.

	Time Scale	Some Need (%)	Great Need (%)
Historical	Pre 1950	42	3
	1950-1970	42	45
	1970-1978	6	90
Current	1979	3	90
Forecasts	1979-1989	16	70
	1990-1999	48	16
	Beyond 2000	32	10

Clearly the greatest need in the areas of business and economics is for recent, current and near future data. This reflects some of the reasons given earlier for the continued use of the on-line service when on-line data-bases were said to be the quickest way to keep up to date. However a number of respondents commented that the data available is never current enough.

Users were asked to rank, in order of frequency of need, the kind of information for which they used the data-bases. However only a few respondents ranked their preferences, the majority just indicated their needs. The responses given below are therefore not ranked:

Type of information	US (%)	Non US (%)
Financial information on companies	52	45
Statistical data on industries	64	52
Economic indicator data	70	68
Demographic data	45	35

Most suppliers of non-bibliographic on-line data-bases offer a variety of software tools to allow for specialized analysis of data on-line. To see how much use respondents made of these facilities we asked how often they used them.

Frequency	% of respondents
Always	23
Frequently	42
Occasionally	10
Never	22
No response	3

65% of the respondents are regularly using the software facilities. The 22% who never use them may be due to the fact they did not purchase these facilities. However, this is not likely since it would be very restrictive to purchase access to data-bases with no means to successfully analyse the data. In fact 16% of those who responded 'never' are Predicasts only users, a base with only limited manipulating facilities.

The average ratio of time spent on-line between data retrieval and analysis was 1 : 35 with over 40% not responding. The non-respondents include a few users who felt that the ratio of retrieval was minute compared to analysis and therefore thought the question unreasonable. It is possible that a number of non-respondents shared this view.

48% of respondents reported frequently having to further analyse manually data retrieved on-line and 32% occassionaly had to do this. It is not possible to deduce from these figures if this is mainly due to a lack of sophisticated software, however, 84% of respondents said there were sufficient capabilities available on-line for them to successfully analyse the data retrieved.

User Training

26% of the searchers were members of library or information staff, a further 26% were specially trained in on-line techniques but the largest group, 39% were self-taught operators.

Respondents were asked how they were trained, and could select one or more of the categories listed below:

Source of training	% of respondents
Data-base supplier	39
On-line services (vendors and time-sharing firms)	55
Library/Information staff	26
Colleagues (non-library/info. staff)	19
Instructional tools	19
No response	6

48% of respondents reported that training was in the form of short, intensive courses, 6% had regular sessions; and 39% said training was intermittent.

The average length of time for training was 8 hours or 2½ days. Two respondents were given 1-2 weeks training and one more than a month full time. With regard to satisfaction with available training programmes and user aids 13% felt very satisfied, 71% satisfied and 16% unsatisfied. Although the situation concerning training programmes seems to be fairly satisfactory none of those programmes are geared to the needs of librarians or information staff.

We asked if users would consider attending a short training course organized by library/information schools either at the school or at their place of work. 48% responded favourably with 52% not very keen. A number of clients when interviewed said they would encourage other members of their staff to attend such courses if they were asked. It is interesting to note that of those who answered 'yes', less than half were in the library/information profession.

Generally speaking, suppliers/venders said they approved of the concept of library/information science schools introducing some programmes of training for potential users of non-bibliographic data-bases, particularly since it would introduce a wider audience to their developments in information retrieval and anlaysis. A number of searchers were themselves very interested with the idea of library/information specialists actually helping and advising with the on-line services and one economist said he was only concerned with using data not retrieving it.

Impact of on-line services

Clients were asked to outline their reaction to non-bibliographic on-line services by selecting/not selecting a list of given characteristics commonly attributed to on-line systems.

90% of the respondents reported non-bibliographic data-bases to be versatile, convenient and time-saving, 52% said they were easy to use and 42% said they were current enough. But only 39% reported them as being economic, reliable or with good customer support.

Respondents were asked what impact, if any, the on-line service had on users, clients, information staff etc. e.g. reduction in staff numbers, increase in workload etc. Their comments are given below:

"Increasing number of users"
"Reduction of programmes for the setting-up of in-house data-bases"
"Has attracted customers with a wider range of interests"
"Provides a better service"
"Staff reduction in the information department"
"Reduction in hard copy purchase"
"Increased borrowing from other libraries"
"The same number of staff can do more work"
"The scope of searches undertaken has broadened"
"Encouraged more people to ask for searches"
"More effective research and development possible"
"Management tends to demand more information and expect a quicker turn-around time for preparation and presentation"
"Better flow of information to end-users"
"Less use of library/information staff"
"Greater appreciation of available facilities"

Other sources of information used by respondents was also requested.

Source of information	% of respondents in each group
Company library or information department	84
Research or professional organizations	74
Government services	84
Journals	87
Personal contacts	77
Private consultants	58

These data suggest that on-line services are just one way of finding and analysing information and that users will use a variety of other sources when necessary or maybe in preference. Many repondents requested that more detailed information on-line would be valuable and eventually essential especially when published sources are unable to up-date quickly enough.

Respondents to the questionnaire were invited to comment on any other areas of concern to non-bibliographic on-line data-base users and suppliers which they thought were not provided for in the rest of the survey. Their concluding comments are given below:

Further suggestions from respondents for the general improvement of on-line services:

"More economic and industrial data on European countries" (Librarian/Information Specialist)
"Cannot get original papers quick enough. Vendors should try supplying them" (Manager)
"Sources available in print but not yet on-line" (Librarian/information specialists)
"The turnover of staff with the vendors is very quick and consequently the customer support staff are not familiar enough with the technology. They need more training so we have better training and service" (Financial Analyst)
"Closer up-dating frequency" (Librarian/Information Specialist)
"More free-text bases" (Manager)
"More seminars and reviews" (Manager)
"Show codifications in files where they are not presently shown" (Analyst)
"Legislation, mathematics and news not well covered" (Scientist)
"Although the on-line industry is very competitive we would not change vendors unless absolutely necessary because the joining and signing on processes are so complicated and take up so much time" (Financial Analyst)

"Set up an agenda-based problem forum to meet regularly" (Manager)
"Long term forecasts for economic data-bases" (Information Specialist)
"More timely up-dating of data-base dictionaries is necessary"
(Financial Analyst)
"Better options for retrieving daily and weekly data. The numbering of days and weeks is confusing. Some data translation matrix is necessary"
(Financial Analyst)
"E.E.C. data-bases would be useful, presumably Euronet will allow them to be accessed?" (Librarian/Information Specialist)
"The information departments are used to a 'pay as you use' service and because they may only call on numeric services occassionally, find the high cost of subscribing prohibitive"
(Librarian/Information Specialist)
"Too much U.S. bias for most data-bases" (Manager)
"Too many services are supported by computer experts who know little or nothing of the true background of what they are selling.
We found this to be the case with General Electric/Honeywell and Cyphernetics/ADP in particular from deep first hand experience.
(Econometrician)
"Graphics facilities and report generation could be improved"
(Librarian/Information Specialist)
"Recently we have been offered services by half a dozen computer outfits with little economic expertise selling data-bases six months out of date..." (Econometrician)

CONCLUSION

The purpose of this project was to investigate the environment in which on-line, non-bibliographic data-bases are being used in the fields of economics and business studies. It has been demonstrated that the multi-national and national corporations, over 50 of whom are spending in excess of £25,000 per year in accessing these bases, are the current users of these systems. But system use is rapidly expanding to medium sized and smaller companies. Information can be accessed from these bases which in many cases cannot be accessed from printed sources.

In most instances it was seen that the on-line interaction was being undertaken by financial analysts, economists and administrative and managerial staff who were providing information for their colleagues involved in decision making and support for planning and evaluation. With exception of Predicasts which is available on DIALOG - the Lockheed System used to retrieve mostly bibliographic information from a wide range of bases - there were only a handful of library and information staff involved with the retrieval and manipulation of hard data on-line.

With the rapid development of on-line access to non-bibliographic data not only in the fields under survey in this study but also in the sciences and technology, there is little doubt that the physical size of library collection will shrink and the age of the dinosaur library, strangled by the internal complications of its hard copy files and its manual records is over. Librarians must face this new challenge of new methods of accessing and manipulating data efficiently. The ostrich-like mentality which has attempted to ignore the rapidly expanding information industry is dangerous. If the profession does not grasp the implications of what is happening, the reference function may soon become as obsolete as the dodo, and other organisations - the service suppliers and information brokers - will claim this ground as their province. We offer you the 'dinosaur, ostrich, dodo syndrome'.

There is, then, urgent need for schools of librarianship and information science to incorporate on-line teaching packages encompassing non-bibliographic data-bases into their programmes. Students passing through these institutions must be made aware not only of the implication and potential of these on-line data-bases but they must also assimilate the conventions and techniques necessary

for the retrieval and also for some manipulation of hard data on-line if future librarians and information scientists are to maintain their position in what is rapidly becoming an information society.

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